

5788

G-000-1006.93

OPERABLE UNIT 4 - SILOS 1-4 FACTSHEET FOR JUNE 1994

06/01/94

DOE-FN PUBLIC
4
FACTSHEET

**FERNALD**

Environmental Management Project

Remedial Investigation/ Feasibility Study

5788

JUNE 1994

Operable Unit 4 SILOS 1-4

Randi Allen
DOE Manager,
Operable Unit 4
648-3102

5788
6-000-1006
Introduction

The Remedial Investigation/Feasibility Study is the blueprint for cleanup at the U.S. Department of Energy's Fernald Environmental Management Project. The nature and extent of contamination at the Fernald site and surrounding areas is being thoroughly investigated so that appropriate remedial actions can be formulated and implemented.

The Fernald site has been divided into five sections, known as Operable Units, for environmental investigation and cleanup. The Operable Units were defined based on their location or the potential for similar technologies to be used in the ultimate cleanup.

During the course of the RI/FS effort, certain conditions are occasionally identified which call for more immediate action. These actions are called "removal actions" and are initiated when there is a need to accelerate cleanup activities to address releases or potential releases of hazardous substances.

At the present time there are no removal actions taking place in Operable Unit 4. Three removal actions were successfully completed in November 1991 (bentonite installation in Silos 1 and 2); April 1991 (decant sump tank); and January 1992 (Silo 3 hopper and assembly removal). All removal actions at Fernald are coordinated with the U.S. EPA and the Ohio EPA.

Following is a progress report on Operable Unit 4 including its history, the current status of RI/FS activities, and cleanup alternatives under consideration.

Background

K-65 Silos 1 and 2 contain radium-bearing

radioactive wastes dating back to the 1940s. The two silos were reinforced with an earthen berm in 1964, and the berm was upgraded in 1983. Other past improvements included a 30-foot cap which was installed on top of the silo domes for added protection, and a polyurethane foam coating that was applied over the domes for weather protection. A Radon Treatment System (RTS) was constructed, and radon gas monitors were installed around the Fernald site boundary and in the immediate vicinity of Silos 1 and 2. Silo 3 contains dried uranium-bearing wastes, and Silo 4 is empty.

RI/FS Activities

Site Characterization: All site characterization activities associated with the Operable Unit 4 RI/FS have been completed. Data from the analyses of collected samples has been received and validated. The data has been compiled in the Remedial Investigation and Feasibility Study reports. Field activities included the completion of borings in the berms surrounding the silos, the soils beneath the silos, and the contents of the concrete structures. Above background concentrations of radionuclides and other contaminants have been identified in surface and subsurface soil, sediment and surface water, and groundwater within and adjacent to the Operable Unit 4 study area.

Reports: The Remedial Investigation (RI) Final Report for Operable Unit 4, including all validated analytical data from sampling activities, was conditionally approved by the U.S. EPA and Ohio EPA in January 1994. The RI Report provides details about the nature and extent of contamination in Operable Unit 4 and establishes

remedial action objectives. The report also includes a Baseline Risk Assessment for Operable Unit 4. This Baseline Risk Assessment evaluates the pathways of exposure and the extent of exposure for existing conditions prior to any remedial activities in Operable Unit 4. Based on the results of the site investigations and risk calculations, the risks associated with Operable Unit 4 exceed generally-accepted regulatory thresholds, thereby necessitating the implementation of remedial actions.

Viable remedial action alternatives are evaluated in the Operable Unit 4 Feasibility Study (FS) Report, which was submitted to the U.S. EPA ahead of schedule on September 9, 1993. Fernald's Sitewide Environmental Impact Statement (EIS), which addresses requirements of the National Environmental Policy Act (NEPA), was integrated into the FS with the NEPA Cumulative Impact Analysis and issued as an appendix. The Sitewide EIS evaluates the leading remedial alternatives for all five Operable Units and the environmental impacts associated with them. The intent was to issue the first FS Report as an integrated document that satisfies both NEPA and CERCLA, to be called a Feasibility Study/Environmental Impact Statement.

In support of the FS development, two treatability study programs were completed. One Treatability Work Plan approved by the U.S. EPA evaluated cementation and chemical extraction technologies for Operable Unit 4 wastes.

The cementation study involved the evaluation of different cement and additive formulations, focused on producing the best mix design which retards contaminant leaching and provides acceptable physical properties such as waste form strength. Testing for durability, radon emanation, and radon leaching, also was completed. Results indicate that cementation is a viable alternative; however, the resulting waste volume is as much as triple its original volume.

The chemical extraction portion of the study focused specifically on the potential for removing certain radionuclides and heavy metals from the K-65 residues through acid/solvent digestion and extraction techniques. Testing for radon emanation and radon leaching of the vitrified

waste stream, which contains the bulk of the radionuclides and heavy metals, was completed. The remaining waste stream would require treatment prior to final disposition, due to the presence of elevated levels of radionuclides and heavy metals.

The second Operable Unit 4 Treatability Study Work Plan examined vitrification of the waste materials from Silos 1, 2, and 3. Samples of materials in the silos were transferred to the Battelle Pacific Northwest Laboratory in Richland, Washington, where the tests were performed.

Vitrification test results were favorable in achieving significant waste volume reduction and retarded contaminant migration.

Results of both treatability studies are contained in the Operable Unit 4 FS Report. These technologies were tested to provide information to support the determination of which technology provides the most environmentally-sound, cost effective and implementable method for treating the wastes prior to final disposal. The Operable Unit 4 Feasibility Study Final Report was approved by the U.S. EPA in May 1994, pending resolution of EPA comments.

DOE also submitted its Proposed Plan for Remedial Action for Operable Unit 4 to the U.S. EPA in September 1993. In the Proposed Plan, DOE identifies an initial preference for vitrification of the contents removed from Silos 1, 2, and 3 and the decant sump tank sludge, followed by off-site shipment of the vitrified material for disposal at the Nevada Test Site. Demolition debris from the silos and contaminated soils excavated in the vicinity would be stored at Fernald on an interim basis, in a manner consistent with the approved work plan for Improved Storage of Soil and Debris (Removal Action No. 17).

Public Comment Period Extensions

The Operable Unit 4 Feasibility Study/Proposed Plan-Draft Environmental Statement (FS/PP-DEIS) was issued for public comment in March 1994. This public comment period was originally scheduled to end on April 20, 1994. However, the public comment period was extended to May 20, 1994 in response to a request for an extension received from the Citizens' Advisory Board for

the Nevada Test Site (CAB). The CAB was formed in March 1994 to assist the Department of Energy-Nevada (DOE-NV) in addressing stakeholder concerns involving major program decisions affecting the community around NTS such as disposal of Operable Unit 4 waste at NTS. A second extension to the public comment period for the FS/PP-DEIS (until May 19, 1994) was granted to allow the citizens of Nevada additional time to review these documents.

Proposed Draft Record of Decision

As a result of the extensions to the public comment period, the United States Environmental Protection Agency (USEPA) extended the submittal date for the Operable Unit 4 Proposed Draft Record of Decision to August 9, 1994. The Proposed Draft Record of Decision documents the selected remedy for remediating Operable Unit 4.

The major components of the selected remedy which will be presented in the Proposed Draft Record of Decision consist of the following:

Removal of the contents of Silos 1, 2, and 3 (K-65 residues and cold metal oxides) and the decant sump tank sludge.

Vitrification (glassification) to stabilize the residues and sludges removed from the silos and decant sump tank.

Off-site shipment for disposal at the NTS of the vitrified contents of Silos 1, 2, 3, and the decant sump tank.

Demolition of Silos 1-4 and decontamination, to the extent practical, of the concrete rubble, piping, and other generated construction debris.

Removal of the earthen berms and excavation of contaminated soils within the boundary of Operable Unit 4, to achieve proposed remediation levels. Placement of clean backfill following excavation (i.e. structure, foundations or large excavations which affect local topography).

Segregation of non-contaminated soils, demolition of the vitrification treatment unit and

associated facilities after use. Decontamination or recycling of debris prior to disposition.

On-property interim storage of excavated contaminated soils and remaining contaminated debris in a manner consistent with the approved Work Plan for Removal Action 17 (improved storage of soil and debris).

Continued access controls and maintenance, and monitoring of the stored wastes inventories.

Institutional controls of the Operable Unit 4 area such as deed and land use restrictions.

Potential additional treatment of the stored Operable Unit 4 soil and debris using Operable Unit 3 and 5 treatment systems.

Pumping and treatment of any contaminated perched water encountered during remedial activities.

Disposal of remaining Operable Unit 4 contaminated soils and debris consistent with the selected remedies for Operable Units 5 and 3 respectively.

Other Activities

Minimum Additive Waste Stabilization:

Activities in support of the Minimum Additive Waste Stabilization (MAWS) program were restarted September 30, 1993, a month after MAWS equipment was shut down as a result of an incident in which a subcontractor employee received burns from a flash fire.

The incident occurred August 30, 1993, while glass gems were being made in Plant 9 during the equipment-test phase of the program. The operator erroneously sprayed an aerosol graphite compound onto a steel plate used to catch molten glass to form gems. The operator thought applying graphite would improve the operation. However, the aerosol propellant was drawn into the melter unit and caused ignition and a flash fire. The operator was treated at a local hospital and released.

As a result, FERMCO shut down MAWS equipment to reassess the program's operating and safety protocols, and implement appropriate corrective actions. MAWS equipment was

successfully restarted in May 1994.

The MAWS program combines vitrification (transforming waste into glass), water treatment and soil decontamination processes. MAWS equipment at Fernald includes a soil decontamination unit, a melter with an off-gas system, and a water treatment system.

The MAWS program is designed to blend waste materials with contaminated soils and, through the use of electricity, melt them into a stable glass form which is safe for permanent disposal. This process yields three effluent streams: 1) clean water; 2) clean soil, and 3) glass.

The soil decontamination process separates contaminated soils into clean and contaminated portions. The contaminated portion is blended with other wastes (such as Fernald pit wastes) and melted into a stable glass form. The clean portions can be used as excavation backfill as needed at Fernald.

Vitrification Pilot Plant

The OU4 Vitrification Pilot Plant consists of the design, construction, and operation of a one metric ton per day output facility for vitrification of K-65, and Silo 3 material, waste retrieval from the silos, and an off-gas treatment system. The Pilot Plant Project will be conducted in phases.

Phase I will involve loading bentonite and surrogate materials into Silo 4 for demonstration of waste retrieval technologies. The Silo 4 material will be transported to the vitrification facility for processing. Prior to entering the vitrification furnace, a metallic stream of elements will be added to the surrogate material to more closely simulate K-65 material. No surrogate material will be used to demonstrate Silo 3 material. The vitrification facility will demonstrate the equipment and processing method. It is estimated that Phase I will require approximately

20-30 metric tons of surrogate material to adequately demonstrate vitrification and approximately 1,500 metric tons to fully demonstrate waste retrieval.

Phase II will involve the hydraulic removal of K-65 material and pneumatic removal of Silo 3 material, and radon control for the Silos 1 and 2 headspace gas using the existing radon treatment system. The off-gas treatment system in the vitrification facility will also treat radon gas given off from the vitrification process. Radon control at the silos and the vitrification facility off-gas treatment are two independent systems. It is estimated that Phase II will require approximately 20 metric tons of K-65 material and 10 metric tons of Silo 3 material. K-65 and Silo 3 material will be mixed at a predetermined ratio, then vitrified. Glass formulations have been optimized by previous lab scale testing and will be further optimized (if required) during the pilot scale testing.

Phase I engineering is nearing completion and construction is scheduled to begin June 1994. Phase I startup operations is scheduled to begin in February 1995 and will require approximately 90 days. Phase II engineering is scheduled to be complete by October 1995 while construction will begin January 1995. Phase II operations is scheduled to begin June 1995 and like Phase I, will require approximately 90 days.

For More Information

More information about Operable Unit 4 is available in the Public Environmental Information Center (PEIC), where Fernald Project cleanup documents are kept in the Administrative Record. The PEIC is located in the JAMTEK building, 10845 Hamilton-Cleves Highway, Harrison, Ohio, 45030. The telephone number is (513) 738-0164.